

COMPRESSOR AMPLIFIER

— 179 - 140 —

CONTENTS:**DRAW. No.:**

Technical Specifications		179-1311-A-4
Terminals & Interconnections		179-1402-B-3
Characteristics, Input Filter		179-1219-A-4
Input-Output Terminations		179-1420-A-4
Instruction for Alignment, Block Diagram		179-1222-A-4
Diagram Compressor Card	179-1240	179-1330-A-3
Component Lay-out		179-1341-A-3
Electrical Partslist		179-1331-A-4
Diagram Amplifier Card	179-1342	179-1332-B-3
Component Lay-out		179-1343-B-3
Electrical Partslist		179-1333-B-4
Diagram Switch Unit	179-A1	179-A130-A-4
Component Lay-out		179-A141-A-4
Electrical Partslist		179-A131-A-4
Diagram Switch Unit	179-A2	179-A230-A-4
Component Lay-out		179-A241-A-4
Electrical Partslist		179-A231-A-4
Diagram Switch Unit	179-A3	179-A330-A-4
Component Lay-out		179-A341-A-4
Electrical Partslist		179-A331-A-4
Diagram Switch Unit	179-A4	179-A430-A-4
Component Lay-out		179-A441-A-4
Electrical Partslist		179-A431-A-4

Supply Voltage	: $\pm 15V$ dc $\pm 10\%$
Maximum Ripple Voltage	: 0.1 V pp
Current Consumption, steady state	: approx. 100mA
Current Consumption, during heat-up	: approx. 275mA in 45 seconds
Temperature Range	: -20 to $+60^{\circ}C$ (-4 to $+140^{\circ}F$)
Frequency Range (0.5dB points)	: 20 c/s to 20,000 c/s
Input Filter	: see fig. 4
Input Impedance within freq. range	: see Input Terminations fig. 1
Output Impedance within freq. range	: see Output Terminations fig. 2
Minimum Load Impedance	: 100 ohms
Basic Amplification	: see fig. 3 Characteristics
Compression Range	: see fig. 3 Characteristics
Compression Ratio	: adjustable 1:1 2:1 3:1 5:1 20:1
Attack Time	: adjustable 100 microseconds 20dB to 200 milliseconds 20dB (11 steps)
Recovery Time	: adjustable 60 milliseconds 20dB to 4 seconds 20dB and one "Auto" position (11 steps)
"Auto" dual time constants	: 200 msec. upon 15 seconds
Recovery Delay	: switchable 0 or 50 milliseconds
Distortion under static conditions	: less than 0.5% up to 20dB gain reduction
Signal to noise ratio at compression threshold	: 80 dB A-curve
Instrument Output	: 0 to 1 mA for 0 to 20dB compression Linear dB scale

Limiter Function

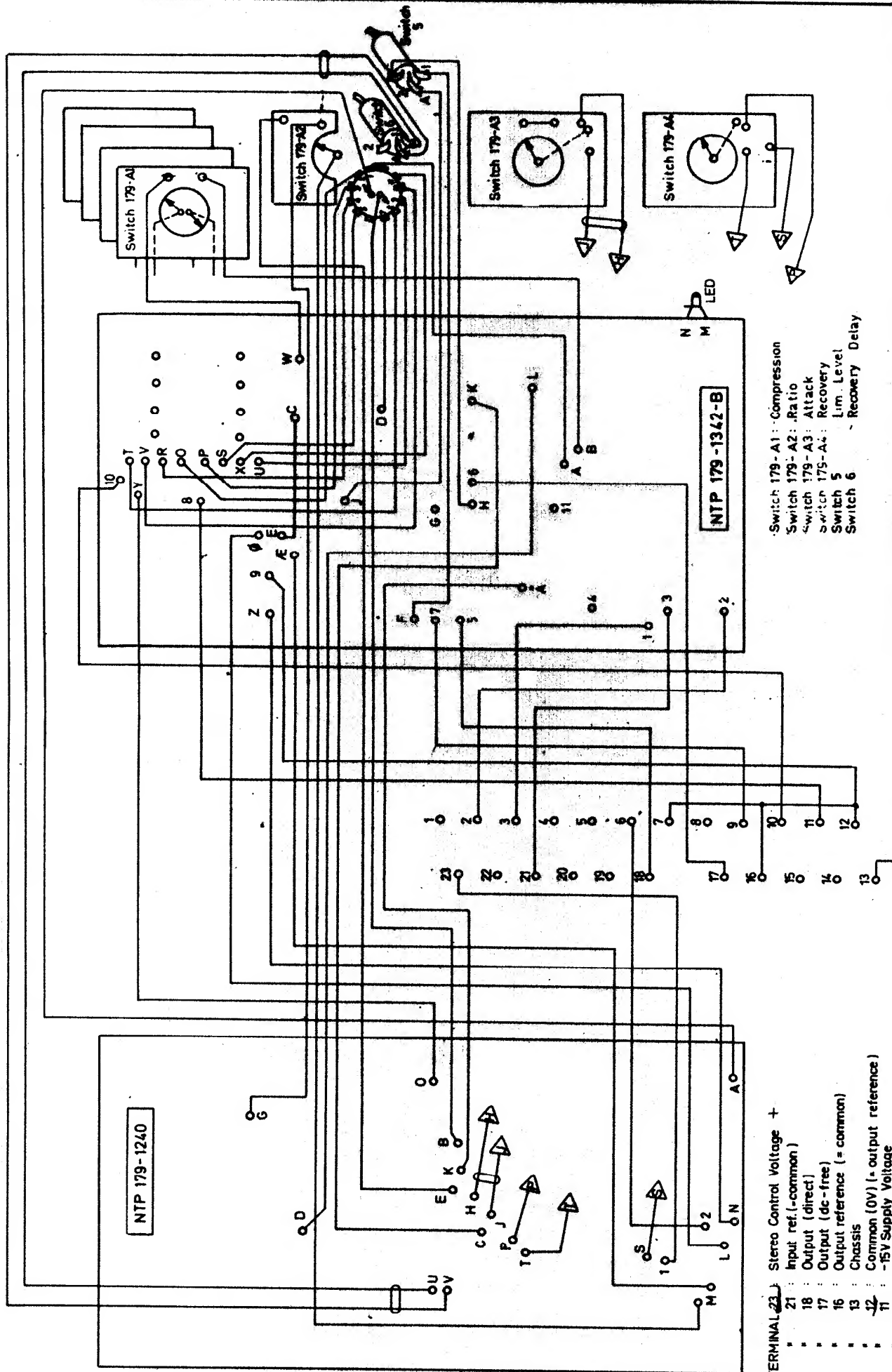
Attack Time	: 1.5 millisecond combined with a full-wave logarithmic clipping circuit
Recovery Time	: following the recovery time set for the compressor
Limitation Threshold "Normal" Note 1	+6 dBu output with any of the three output-terminations shown in fig. 2
Limitation Threshold "High" Note 1	+19 dBu output when using the 0.7 : 1 output transformer +16 dBu output when using the direct output or the 1:1 output transformer

Stereo Operation

The control voltages of two units may be linked so as to obtain equal gain reduction in the two stereo channels. The control voltage is accessible at the connector.

Connector	: Tuchel T2700	Standard Colour	: Dull Black
Mechanical Outline	: Al-module		
Front	40x190mm (1.58x7.5")	Weight	: approx. 1 Kg (approx. 35 oz.)
Depth	105 mm (4.1")		

Note 1: The limitation level stated above applies to steady state conditions. Peaks shorter than 1.5mS will be limited at a level max. 3dB above steady state conditions.



- TERMINAL 23 : Stereo Control Voltage +
- 21 : Input ref. (-common)
 - 18 : Output (direct)
 - 17 : Output (dc-free)
 - 16 : Output reference (= common)
 - 13 : Chassis
 - 12 : Common (0V) (- output reference)
 - 11 : -15V Supply Voltage
 - 10 : +15V
 - 7 : Instrument Output negative
 - 6 : " " positive
 - 3 : Input (dc-free)
 - 2 : " (direct)
 - 9 : Gain reduction term. (-3dB when started to term. 18)

Switch 179-A1 : Compression
 Switch 179-A2 : Ratio
 Switch 179-A3 : Attack
 Switch 179-A4 : Recovery
 Switch 5 : Lim. Level
 Switch 6 : Recovery Delay

Pos.	Antel.	Material:	Behandl.	Del. #
Material:				
Tolerance:	±	mm		
Temp.	25.4.75	°F		
Weight:				
Resistance:	1			
Compressor Amplifier 179-140				
Terminals and Interconnections				
NTP				
179-1402-B-3				

Fig. 3

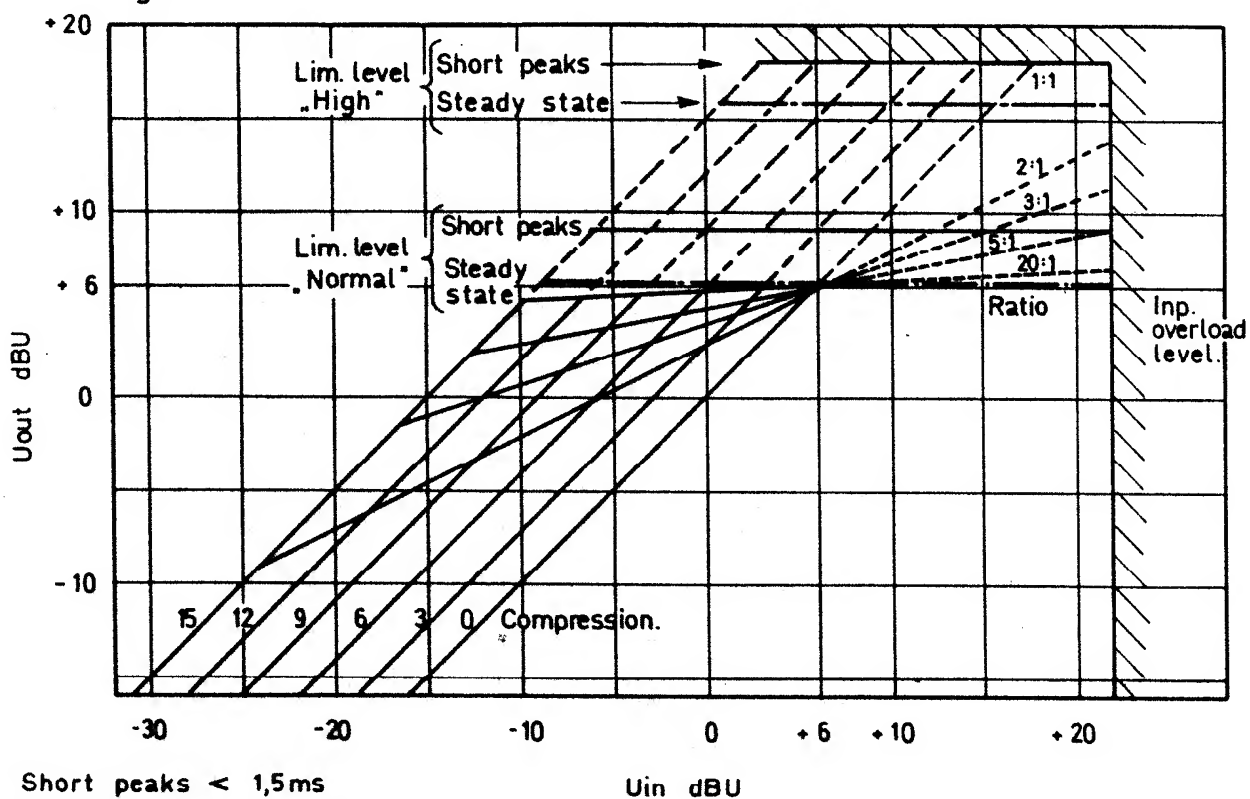
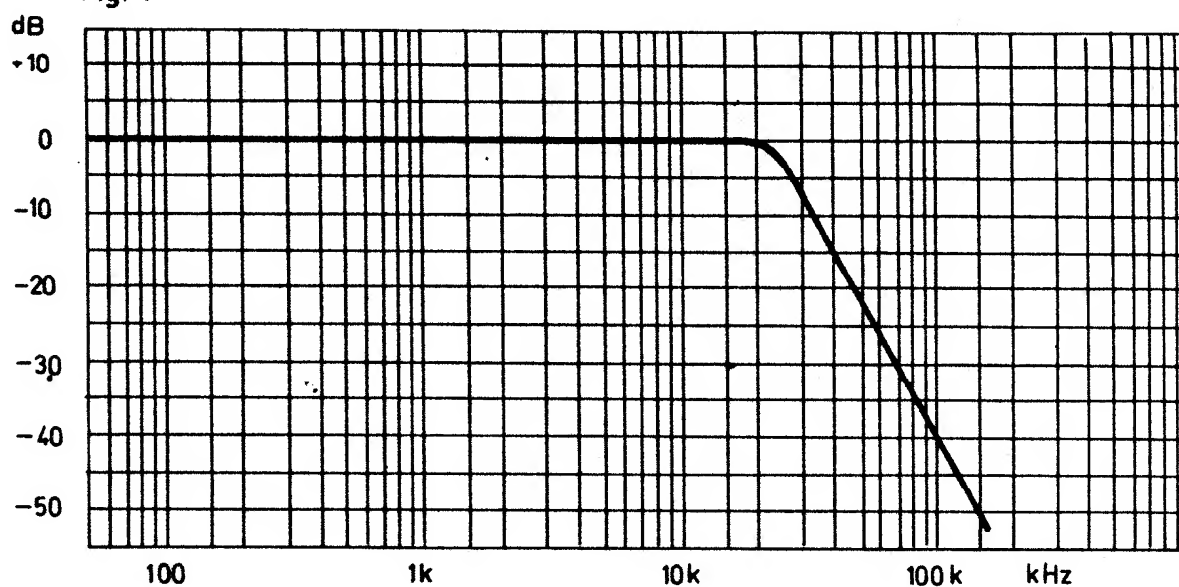
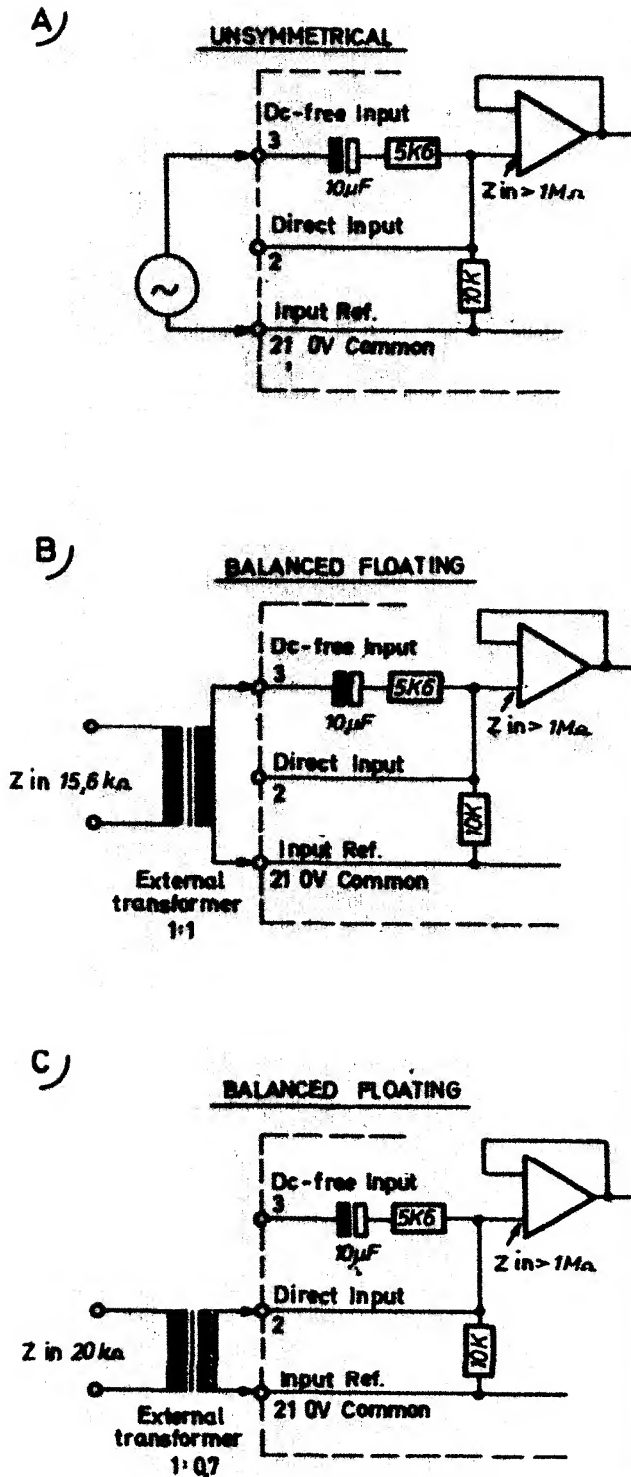


Fig. 4

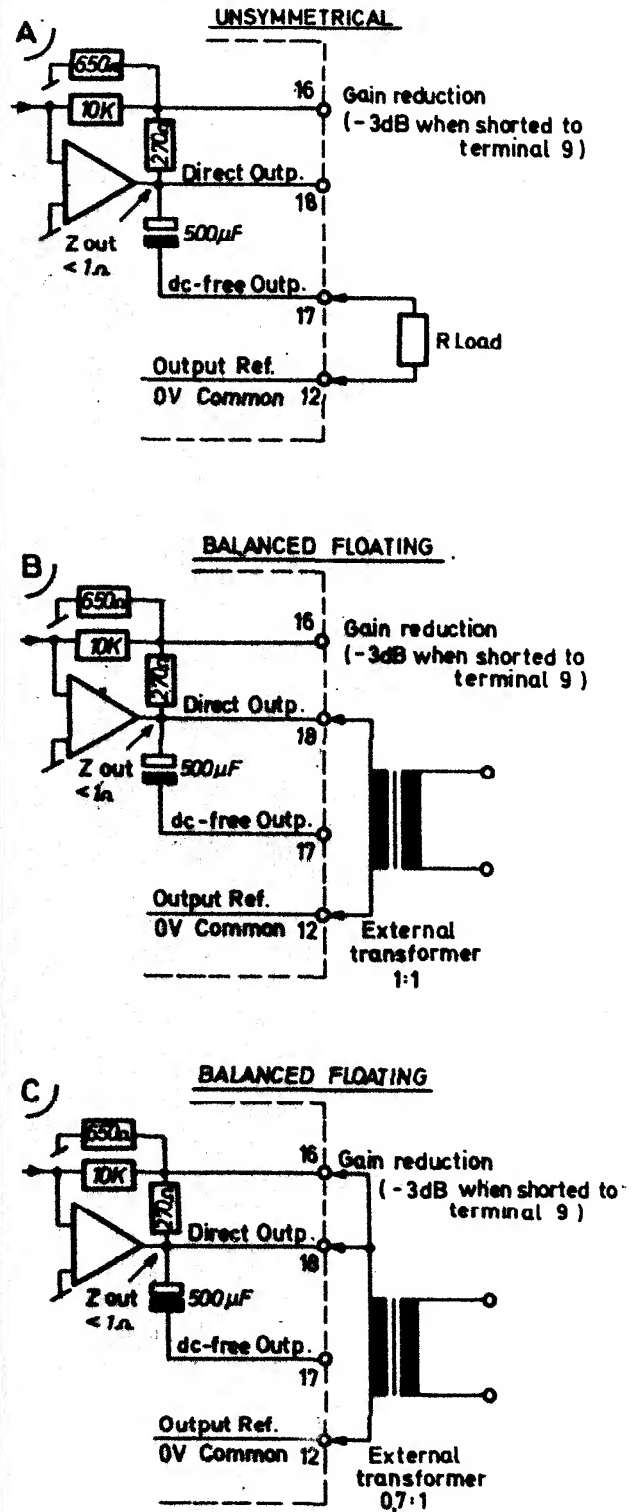


INPUT FILTER CURVE

INPUT TERMINATIONS fig. 1



OUTPUT TERMINATIONS fig. 2



Denne tegning gælder for følgende SN.
leveret til Kajaani og DR.
7380-7414, 7477-7480, 7848-7870, 8101-8105.

Normally the Compressor Amplifier will stay correctly adjusted, except when a component has failed and has been replaced; then it may be necessary to make certain adjustments. Before attempting to make any adjustments, note the permissible indication errors stated in Technical Specifications.

The functions of the trimpotentiometers are as follows:

- P1 Bias adjustment of Op. amp A1
- P2 Compensates for individual pinch-off of the F.E.T. (Q1)
- P3 Compensates for individual slope $\frac{\Delta R_{SD}}{\Delta V_{GD}}$ of the F.E.T.
- P4 Linearity adjustment of the FET Attenuator circuit.
- P5 Adjusts for minimum distortion of the FET attenuator.
- P6 Adjusts the threshold level.

Do not attempt to make any adjustments until the current consumption has fallen to a steady level approx. 100 mA after 60 sec. Correct sequence of adjustments is as follows:

a. Bias adjustment of P1

Conditions: No input signal.
Recovery switch in pos. 0.06 sec.

Connect a DC voltmeter (or DC-oscilloscope sens. approx. 20mV/div.) between TP7 and TP1.

P1 is adjusted until the voltage measured is the same whether TP2 is connected to TP9 or not.

b. Pinch-off adjustment of P2

Conditions: Input signal +6dBu 1kHz
Ratio switch in pos. 1:1
Lim. level switch in pos. "high"

P2 is adjusted until the output voltage is +6dBu (0dB amplification).

The adjustment range can be altered by connecting or disconnecting R15 and/or R16.

c. Slope dB/V and Linearity adjustment of P3 and P4

Conditions: Like referred under pos. b.

A floating external DC-source 0-6 V is connected between term. 3 and 5, term. 3 positive. The DC voltage is set to 3.0 Volt, and P3 is adjusted so that the output level is -9dBu (15 dB attenuation). Now the DC voltage is set to

6.0 Volt, and P4 is adjusted until the output level is -24 dBu (30 dB attenuation). Because of mutual dependence between P3 and P4 the adjustments are repeated until correct output level is obtained.

d. Threshold level adjustment of P6

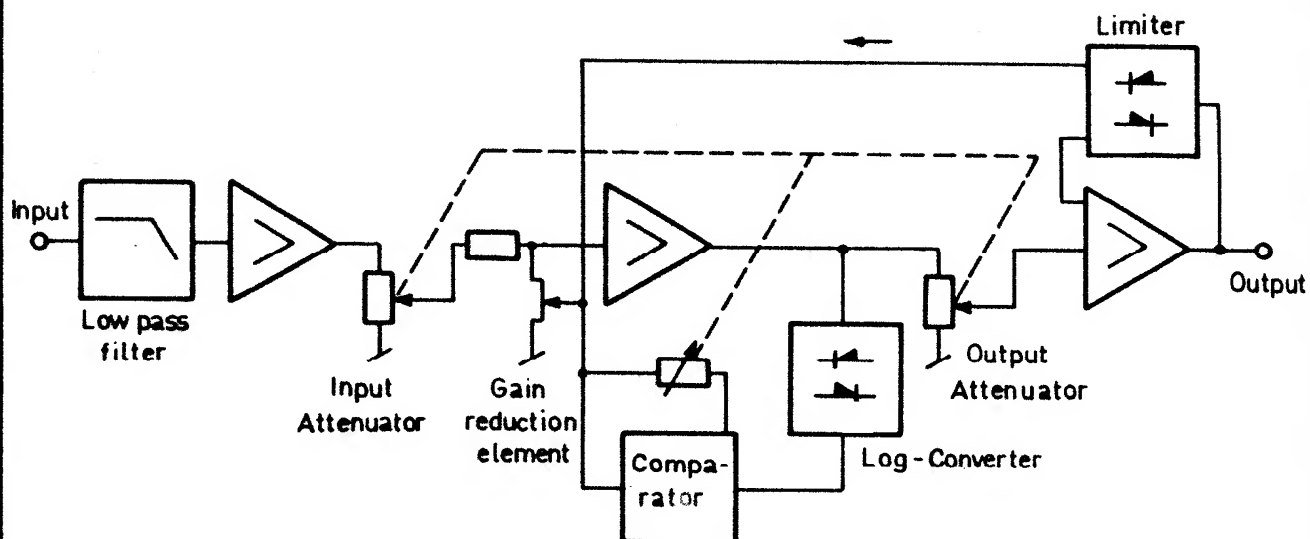
Conditions: Input signal +6 dBu 1kHz
Ratio switch in pos. 20:1
Lim. level switch in pos. "high"
Compression switch in pos. 15 dB

P6 is adjusted to an output level of +6 dBu

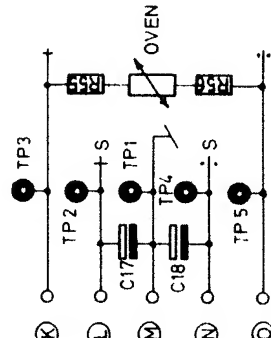
e. Distortion adjustment of P5

Conditions: Ratio switch in pos. 2:1
Input level and the other controls are set like under pos. d.

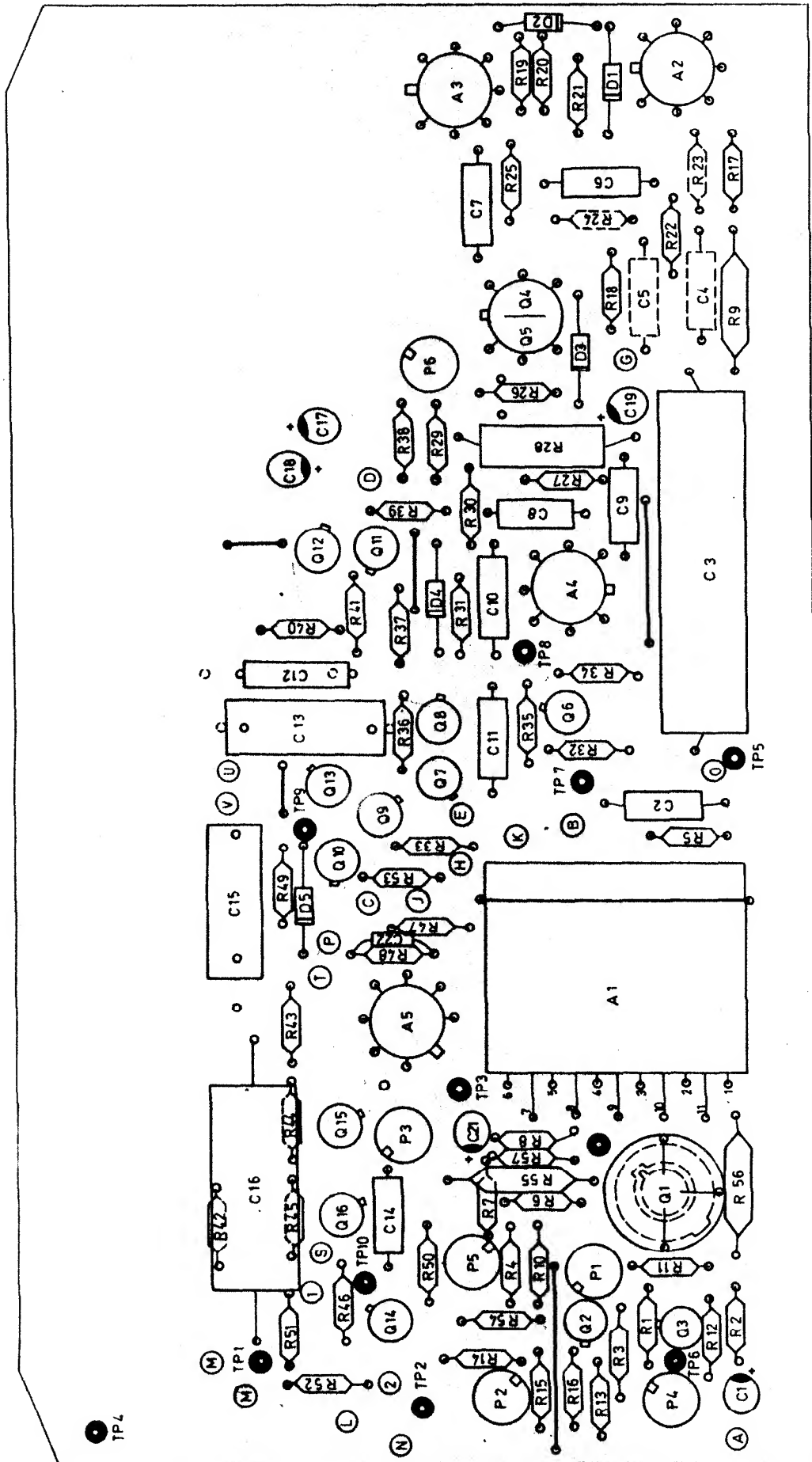
P5 is adjusted to minimum distortion.
Because of interaction between P5 and P2, the adjustment mentioned under pos. b is carried out once more.



BLOCK DIAGRAM



Målestok		mm	in	Tegn	10-5-87	AW
Tolerance				Godek	J	A
Materiale	INGENIØRFIRMAN TONNES PEDERSEN % Compressor Amplifier 179 - 130 (179-140)					
Behandl	Compressor Card 179 - 1240 Diagram					
Del af	TECNING NR 179 - 1330-A-3					
Ansat						

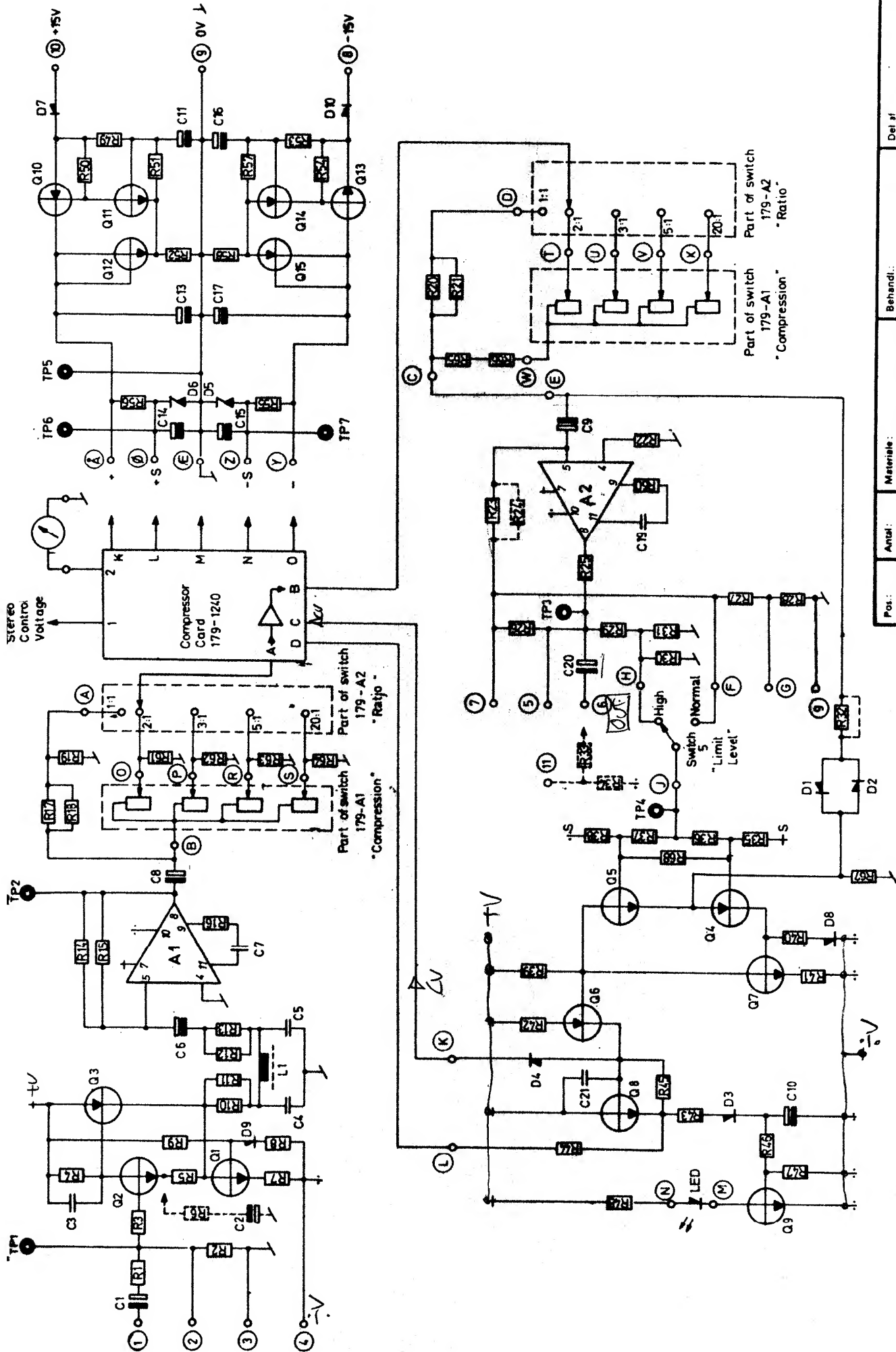


Målestok 2:1 Tolerance + mm + ° Materiale Behandl. Del nr. Antal	INGENIØRFIRMA N. TØNNES PEDERSEN 4%		Tegn. 9-6-71 IW
	Compressor Amplifier 179-130 (179-140)		Godt. B.M.
	Compressor Card 179-1240 Component Layout.		TEGNING NR. 179-1341-A-3

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R1		Resistor 6.8k Ω 1/8W 5%	Resista SK2		
R2		" 6.8k Ω " "	"		
R3		" 1k Ω " "	"		
R4		" 4.7k Ω " "	"		
R5		" 220 Ω " "	"		
R6		" 680 Ω " "	"		
R7		" 390 Ω " "	"		
R8		" 10k Ω " "	"		
R9		" 330 Ω 1/3W "	Beyschlag		
R10		" 18k Ω 1/8W "	Resista Sk2		
R11		" 1M Ω " "	"		
R12		" 10k Ω " "	"		
R13		" 10k Ω " "	"		
R14		" 68k Ω " "	"		
R15		" 82k Ω " "	"		
R16		" 47k Ω " "	"		
R17		" 10k Ω " "	"		
R18		" 10k Ω " "	"		
R19		" 10k Ω " "	"		
R20		" 10k Ω " "	"		
R21		" 10k Ω " "	"		
R22		" 10k Ω " "	"		
R23		" not used (Appx.22k Ω when preamphasis)	"		
R24		" " (" 1k Ω " ")	"		
R25		" 4.7k Ω " "	"		
R26		" 120k Ω " "	"		
R27		" 10k Ω " "	"		
R28	179-1212-A4	" 820 Ω 1/3W 5%	NTP		
R29		" 22k Ω 1/8W "	Resista SK2		
R30		" 330 Ω " "	"		
R31		" 1.8k Ω " "	"		
R32		" 68k Ω " "	"		
R33		" 3.3k Ω " "	"		
R34		" 47k Ω " "	"		
R35		" 10k Ω " "	"		
R36		" 47k Ω " "	"		
R37		" 10k Ω " "	"		
R38		" 47k Ω " "	"		
R39		" 47k Ω " "	"		
R40		" 68 Ω " "	"		
R41		" 680k Ω " "	"		
R42		" 22k Ω " "	"		
R43		" 220k Ω " "	"		
R44		" 470k Ω " "	"		
R45		" 470k Ω " "	"		
R46		" 2.2k Ω " "	"		
R47		" 3.3k Ω " "	"		
R48		" 10k Ω " "	"		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S		STYKLISTE	
BM/DG 5.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partslist		3 Blade - Blad 1 179-1331-A-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R49		Resistor 470kΩ 1/8W 5%	Resista SK2		
R50		" 470 Ω " "	"		
R51		" 39 Ω " "	"		
R52		" 3.9kΩ " "	"		
R53		" 220 Ω " "	"		
R54		" 18kΩ " "	"		
R55		" 47 Ω 1/3W "	Beyschlag		
R56		" 47 Ω 1/3W "	"		
R57		" 4.7kΩ 1/8W "	Resista SK 2		
C1		Tantal Cap. 100μF/3V ETP3	ERO		
C2		Styroflex Cap. 47 pf B31310 5% J	Siemens		
C3		Polyester Cap. 10μF/63V 10% MKT 1813-547/06	Eromet		
C4		not used (when preamplifier 3,3 nf)			
C5		not used (" " 6,7 nf)			
C6		Styroflex Cap. 330 pf B31310 5% J	Siemens		
C7		" " 330 pf " " "	"		
C8		" " 100 pf " " "	"		
C9		" " 470 pf " " "	"		
C10		" " 330 pf " " "	"		
C11		" " 330 pf " " "	"		
C12		" " 6,8 nf/B31310 5% J	"		
C13		Mepo Cap. 0,15μF/250V B32234	Philips		
C14		Styroflex Cap. 330 pf B31310 5% J	Siemens		
C15		Mepo Cap. 0.22μF/250V 332234 10%	"		
C16		Polyester Cap. 4.7μF/63V 10% MKT 1813-547/06	Eromet		
C17		Tantal Cap. 10μF/16V ETP2	ERO		
C18		" " 10μF/16V ETP2	"		
C19		" " 33μF/25V ETP3	"		
C20		not used			
C21		Tantal Cap. 220μF/3v ETP4	ERO		
C22		Styroflex Cap. 22pf/160V	Siemens		
D1		Diode 1 N 4148	Texas Instr.		
D2		" 1 N 4148	" "		
D3		" 1 N 4148	" "		
D4		" 1 N 4148	" "		
D5		" 1 N 4148	" "		
Q1	179-1218 A4	F.E.T. Si 216 N specially selected	AKERS		
Q2		Transistor BC 107 B (A)	Siemens		
Q3		" BC 177 B (A)	"		
Q4		Dual Transistor MD 8001	Motorola		
Q5					
Q6		Transistor BC 177 B (A)	Siemens		
Q7		" BC 177 B (A)	"		
Q8		" BC 177 B (A)	"		
Q9		" BC 107 B (A)	"		
Q10		" BC 177 B (A)	"		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN %		STYKLISTE	
BM/DG 5.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partalist	3. Blade - Blad.....2..... 179-1331-A-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
Q11		Transistor BC 107 B (V)	Siemens		
Q12		" BC 177 B (A)	"		
Q13		" BC 177 B (A)	"		
Q14		" BC 107 B (A)	"		
Q15		" BC 177 B (A)	"		
Q16		" BC 107 B (A)	"		
		Transistor Oven type 5 ST 1-2 (To -18) 80°C	JERMYN		
A1		Linear Amplifier M-100	NTP		
A2		Operational Amplifier LM 301 A	National Semi		
A3		" " LM 301 A	" "		
A4		" " LM 301 A	" "		
A5		" " LM 310	" "		
P1		Trim Potentiometer 10kΩ 3329 H-103	Bourns		
P2		" " 1kΩ 3329 H-103	"		
P3		" " 1kΩ 3329 H-103	"		
P4		" " 1kΩ 3329 H-103	"		
P5		" " 1kΩ 3329 H-103	"		
P6		" " 10kΩ 3329 H-103	"		
		Copper tube rivets S 6086	United Shoe	10	
		Transistor spacers To 18-002		12	
	179-1240 B-3	Printed Circuit Board 179-1240-B	NTP		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S		STYKLISTE	
BM DG 5.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Compressor Card 179-1240 Electrical Partslist		Blade - Blad 3 179-1331-A-4	

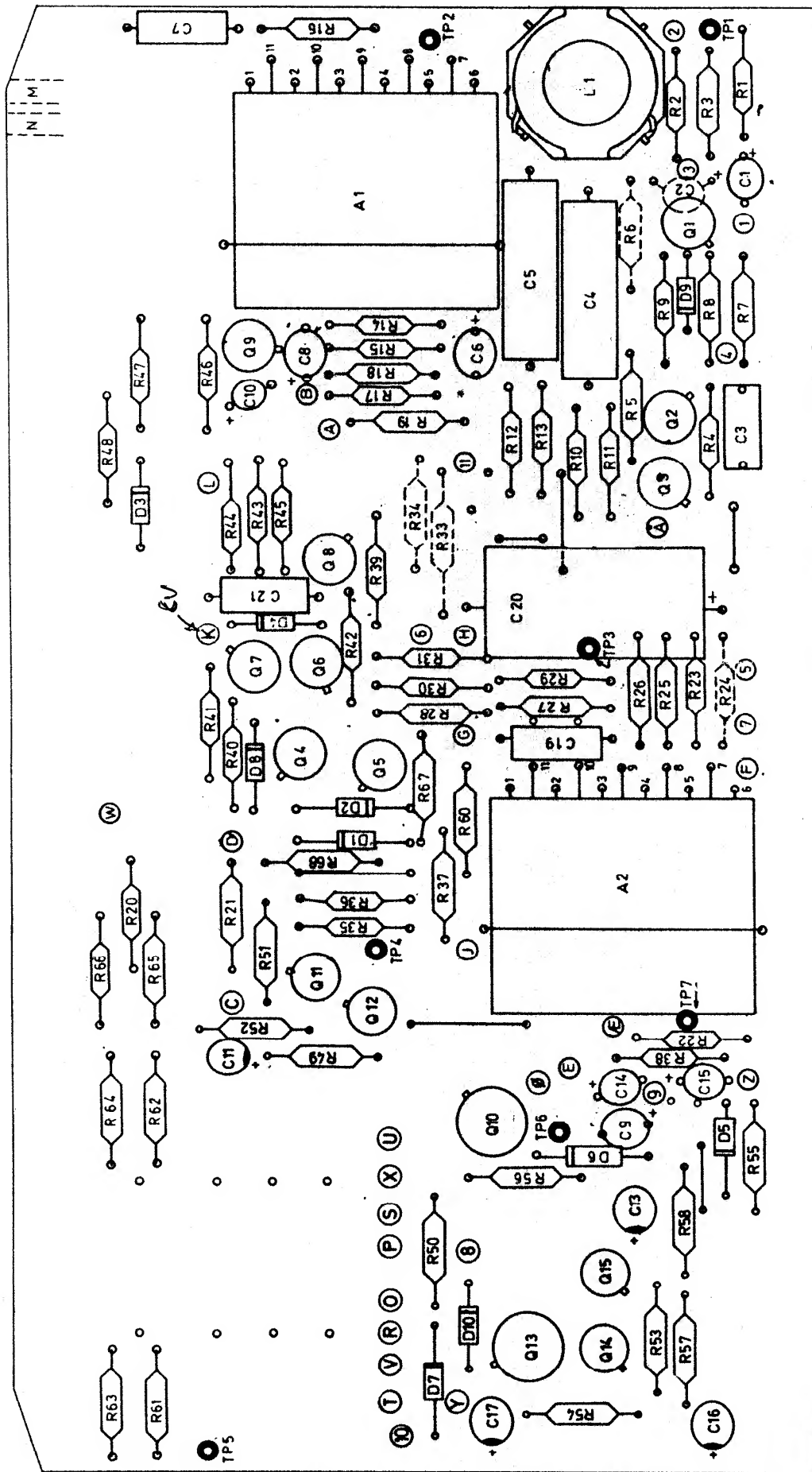


Pos.:	Antal:	Materiale:	Behandling:	Del af
Målestok:		Control Card		
Tolerance: ± mm		Compressor Amplifier 179-130(179-140)		
Tegnet: 30.1.7, 1W		Amplifier Card 179-1342-B		
Godkendt:		Diagram		
Revideret:				

NTP

N. TORRES PUBLICATION A/S

179-1332 - B - 3

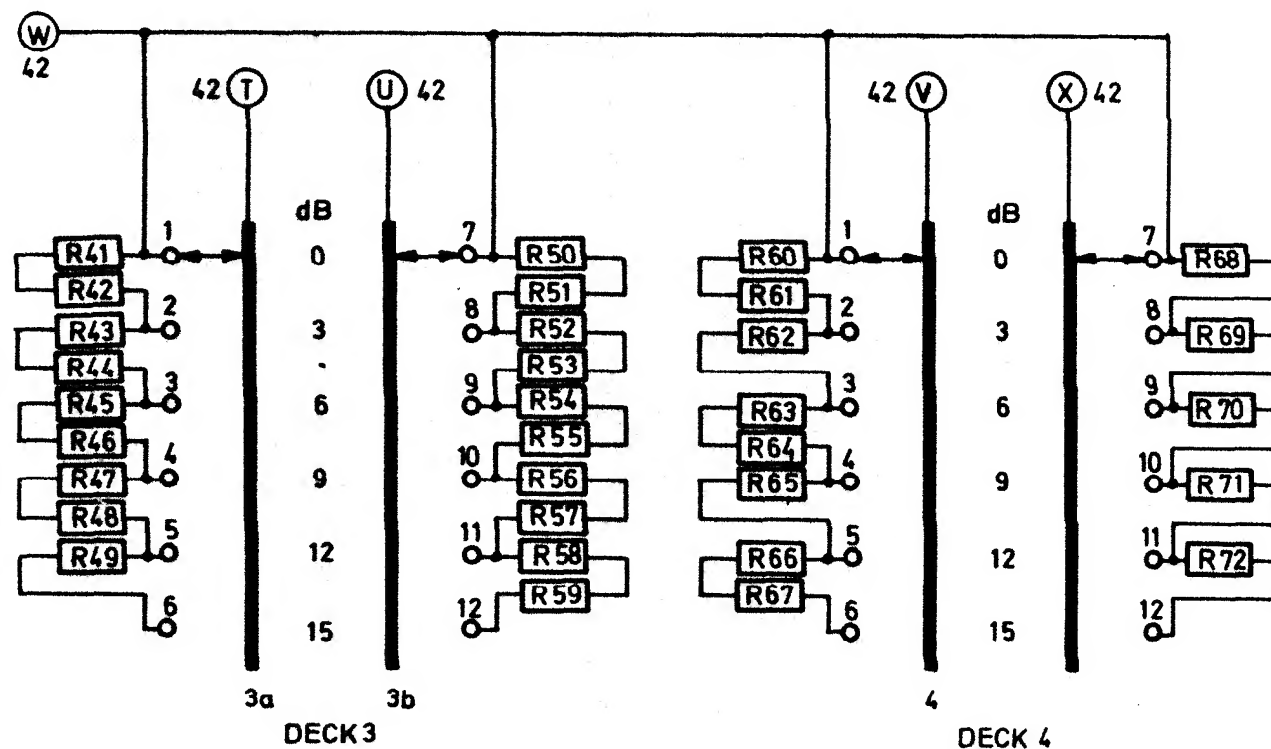
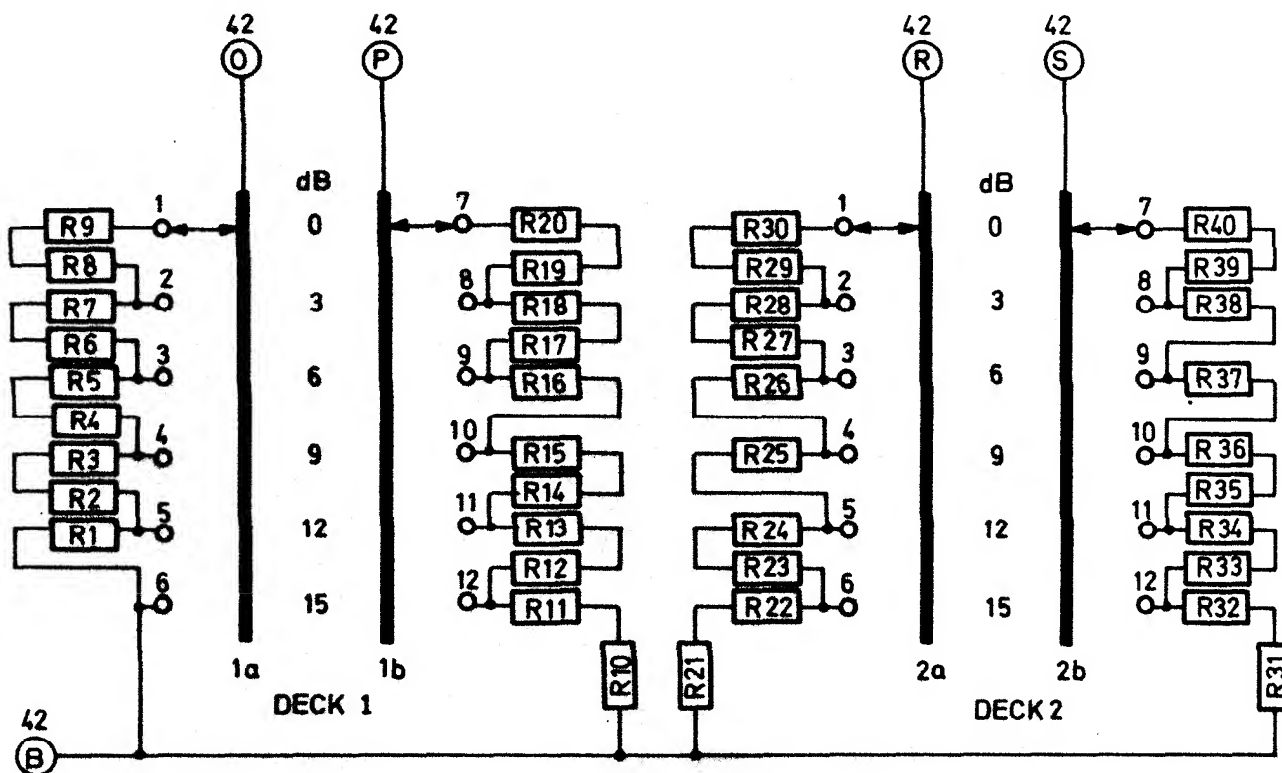


Pos.:	Anteil:	Materiale:	Behandl.:	Del af:
<div> <div> Målestok : 2:1 </div> <div> Tolerance : ± mm </div> <div> Tegnet : 30.1.74 IW </div> <div> Seddelst: </div> <div> Revideret : </div> </div>				
<div> <div>Compressor Amplifier 179-130 (179-140)</div> <div>Amplifier Card 179-1342-B</div> <div>Component Layout</div> </div>				
<div> <div>NTP</div> <div>N. THOMAS PEDERSEN A/S</div> </div>				179-1343-B-3

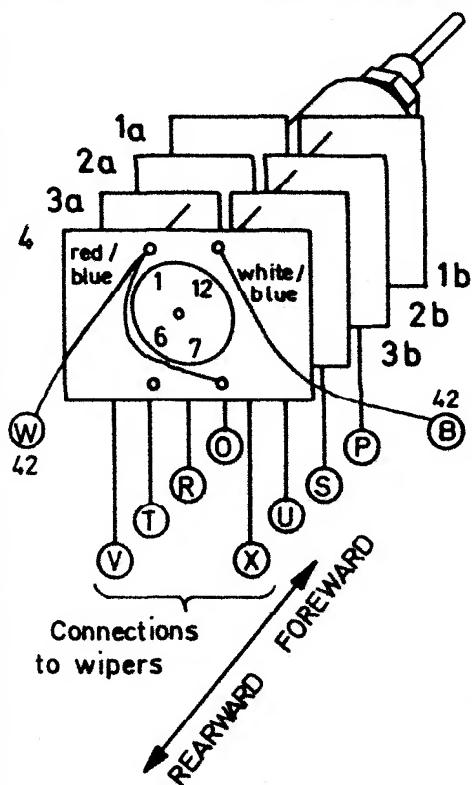
POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R1		Resistor 5.6k Ω 5% 1/8W	Resista SK2 (Beyschlag)		
R2		" 10k Ω " "	"		
R3		" 220 Ω " "	"		
R4		" 2.2k Ω " "	"		
R5		" 1.5k Ω " "	"		
R6		" not used (390 Ω - -8dBu)	"		
R7		" 68 Ω " "	"		
R8		" 270 Ω " "	"		
R9		" 10k Ω " "	"		
R10		" 22k Ω " "	"		
R11		" 2.2k Ω " "	"		
R12		" 2.2k Ω " "	"		
R13		" 22k Ω " "	"		
R14		" 4.7k Ω " "	"		
R15		" 27k Ω " "	"		
R16		" 220 Ω " "	"		
R17		" 150k Ω " "	"		
R18		" 27k Ω " "	"		
R19		" 470 Ω " "	"		
R20		" 8.2k Ω " "	"		
R21		" 1.5k Ω " "	"		
R22		" 10k Ω " "	"		
R23		" 10k Ω " "	"		
R24		" not used	"		
R25		" 18 Ω " "	"		
R26		" 270 Ω " "	"		
R27		" 180 Ω " "	"		
R28		" 470 Ω " "	"		
R29		" 1k Ω " "	"		
R30		" 1.3k Ω " "	"		
R31		" 330 Ω " "	"		
R32		" strapped " "	"		
R33		" not used (330 Ω - -8dBu)	"		
R34		" not used (82 Ω - ")	"		
R35		" 47 k Ω " "	"		
R36		" 5,6 k Ω " "	"		
R37		" 5,6 k Ω " "	"		
R38		" 47k Ω " "	"		
R39		" 2.2k Ω " "	"		
R40		" 2.2k Ω " "	"		
R41		" 2.2k Ω " "	"		
R42		" 2.7k Ω " "	"		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S		STYKLISTE	
EM/DG 3.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Amplifier Card 179-1342 Electrical Partalist		3 Blade - Blad 1	
				179-1333-B-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R43		Resistor 470 Ω 5% 1/8W	Resista SK2 (Beyschlag)		
R44		" 47k Ω " "	"		
R45		" 470k Ω " "	"		
R46		" 100k Ω " "	"		
R47		" 100k Ω " "	"		
R48		" 2.2k Ω " "	"		
R49		" 22K " "	"		
R50		" 10k " "	"		
R51		" 18k " "	"		
R52		" 6K8 " "	"		
R53		" 22K " "	"		
R54		" 10K " "	"		
R55		" 560 Ω " "	"		
R56		" 470 Ω " "	"		
R57		" 18k " "	"		
R58		" 6K8 " "	"		
R59		" not used " "	"		
R60		" 220 Ω " "	"		
R61		" 470 Ω " "	"		
R62		" 470 Ω " "	"		
R63		" 470 Ω " "	"		
R64		" 470 Ω " "	"		
R65		" 2.7k Ω " "	"		
R66		" 120 Ω " "	"		
R67		" 470 Ω " "	"		
R68		" 220K Ω " "	"		
C1		Tantal Cap. 22 μ F/16V ETP3	ERO		
C2		" " not used (100 μ F/3V)			
C3		Styroflex Cap. 470 pF B31310 5% J	Siemens		
C4		" " 4.7 nF " "	"		
C5		" " 4.7 nF " "	"		
C6		Tantal Cap. 33 μ F/10V ETP3	ERO		
C7		Styroflex Cap. 100 pF B31310 5% J	Siemens		
C8		Tantal Cap. 100 μ F/3V ETP3	ERO		
C9		" " 100 μ F/3V ETP3	"		
C10		" " 1 μ F/35V ETP1	"		
C11		" " 10 μ F/35V " "	"		
C12		Styroflex Cap. not used	Siemens		
C13		Tantal Cap. 10 μ F/35V ETP1	ERO		
C14		" " 10 μ F/16V	"		
C15		" " 10 μ F/16V	"		
C16		" " 10 μ F/35V	"		
C17		" " 10 μ F/35V	"		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S		STYKLISTE	
EM/DG 3.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Amplifier Card 179-1342 Electrical Partslist		3 Blade - Blad 2 179-1333-B-4	

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
C18		Styroflex Cap. not used	Siemens		
C19		" " 100 pF B31310 5% J	"		
C20		El.lyt. cap. 500µF/15V EB	ROE		
C21		Styroflex Cap. 220 pF B31310 5% J	Siemens		
D3-4	+ D8+D9	Si-diode 1 N 4148	Texas Instr.	4	
D5-6		Si-Zenerdiode 1 N 821	Motorola	2	
D7+D10		Si-diode 10 D 1	J. R.	2	
Q1		Transistor BC 107 B (A)	Siemens		
Q2		" BC 107 B (A)	"		
Q3		" BC 177 B (A)	"		
Q4		" BC 177 B (A)	"		
Q5		" BC 107 B (A)	"		
Q6		" BC 177 B (A)	"		
Q7		" BC 107 B (A)	"		
Q8		" BC 107 B (A)	"		
Q9		" BC 107 B (A)	"		
Q10		" BC 161-16 (10)	"		
Q11		" BC 107 B	"		
Q12		" BC 107 B	"		
Q13		" BC 141-16 (10)	"		
Q14		" BC 177 B	"		
Q15		" BC 177 B	"		
D1+2		Diode IN 4152 (IN 4153)	Texas o.a.		
A1		Amplifier M-100	NTP		
A2		" M-100	"		
L1	179-1217- A-4	Coil consists of: Potcore: B65651-K0250-A022 Bobin : B65652-A0000-M001 Tag plate: B65655-A0007-X000 Spring : 8x11	Siemens " "		
	179-1342- B-3	Printed Circuit Board 179-1342- B Copper Tube rivets S6086 Transistor Spacers To 18-002 " " To 518-003	NTP United Shoe	7 11 1	
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN A/S		STYKLISTE	
BM/DG 3.5.71		COMPRESSOR AMPLIFIER 179-130 (140) Amplifier Card 179-1342 Electrical Partslist		3 Blade - Blad 3 179-1333-B-4	



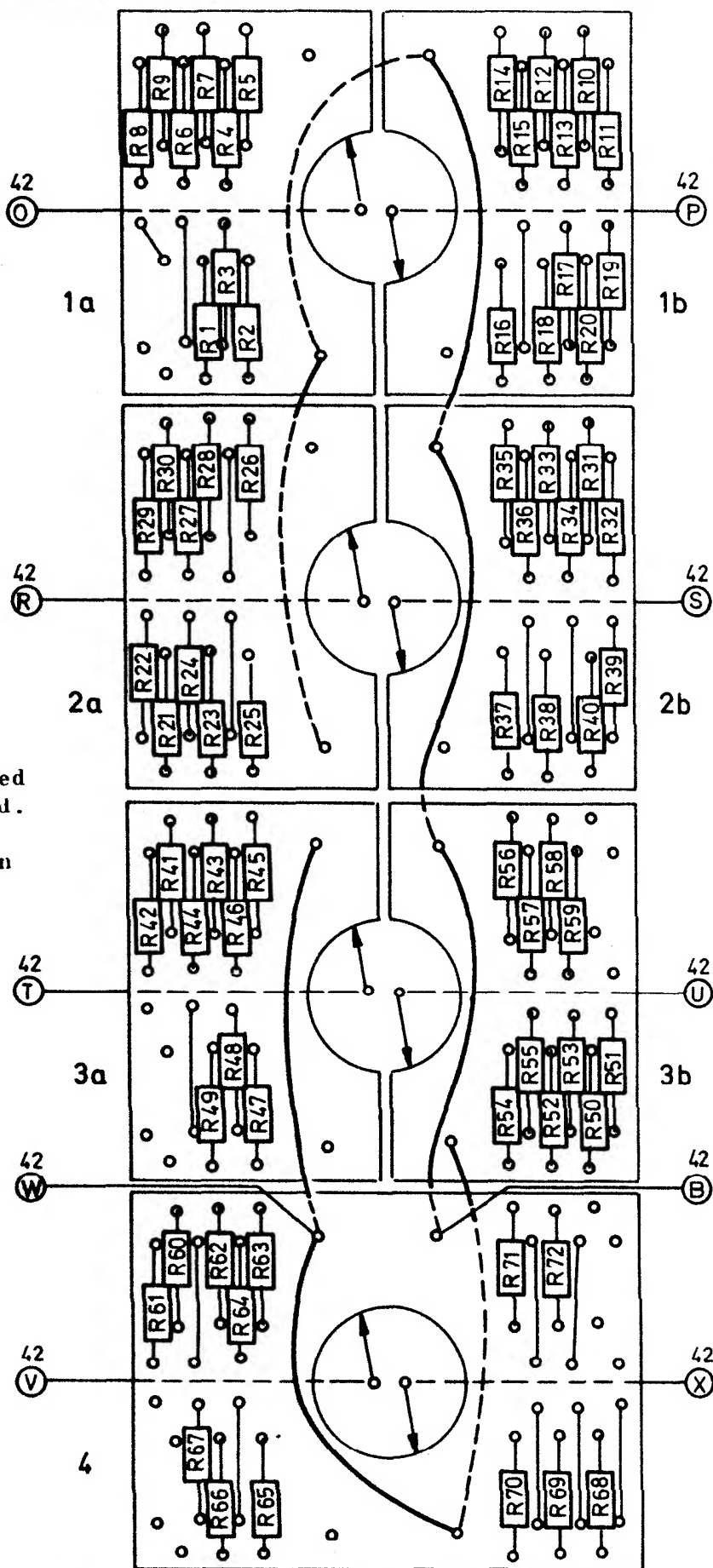
Målestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s		Tegn.	13-5-71 I.W.
Tolerance	± mm ± °	Switch Unit 179-A1 (part of 179-120)		Godk.	
Materiale		Function Compression Diagram		TEGNING NR.	
Behandl.				179-A130-A-4	
Del af					
Antal					



Component side of printed circuits facing rearward.

Switch unit assembled in the following order:

- 1 : wires soldered to wipers
- 2 : deck 4
- 3 : decks 3b and 3a
- 4 : decks 2b and 2a
- 5 : decks 1b and 1a
- 6 : interconnections between decks connected.



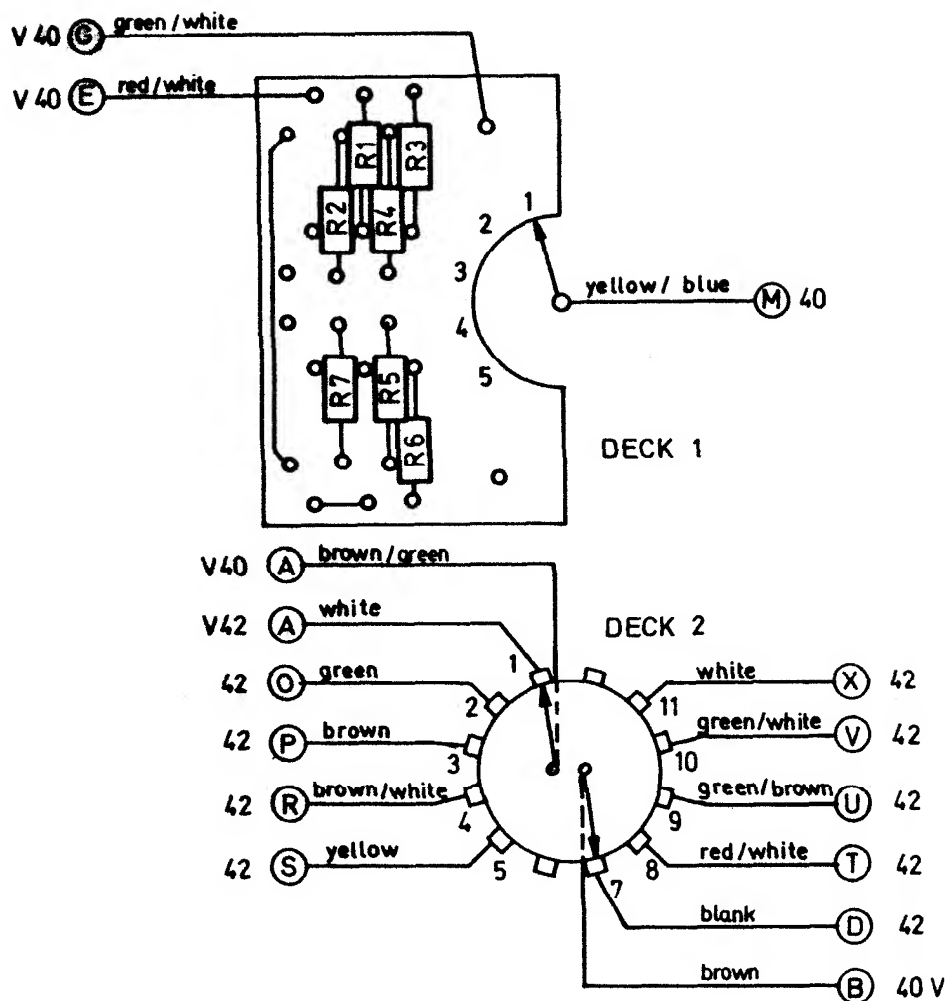
Målestok	2:1	INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71. IW
Tolerance	± mm ± °		Switch Unit 179-A1 (part of 179-120)	Godk.
Materiale		Function: Compression Component Lay - out		TEGNING NR.
Behandl.			179 - A141-A-4	
Del af				
Antal				

POS.	TEGN. NR.	BETEGNELSE				MATERIALE	ANT.	
R1		Resistor	330 Ω	1/8W	5%	Resista SK 2		
R2		"	330 Ω	"	"	"		
R3		"	330 Ω	"	"	"		
R4		"	100 Ω	"	"	"		
R5		"	1.2k Ω	"	"	"		
R6		"	390 Ω	"	"	"		
R7		"	2.2k Ω	"	"	"		
R8		"	560 Ω	"	"	"		
R9		"	4.7k Ω	"	"	"		
R10		"	390 Ω	"	"	"		
R11		"	68 Ω	"	"	"		
R12		"	470 Ω	"	"	"		
R13		"	68 Ω	"	"	"		
R14		"	820 Ω	"	"	"		
R15		"	56 Ω	"	"	"		
R16		"	1.5k Ω	"	"	"		
R17		"	330 Ω	"	"	"		
R18		"	2.2k Ω	"	"	"		
R19		"	270 Ω	"	"	"		
R20		"	3.9k Ω	"	"	"		
R21		"	820 Ω	"	"	"		
R22		"	56 Ω	"	"	"		
R23		"	560 Ω	"	"	"		
R24		"	100 Ω	"	"	"		
R25		"	1k Ω	"	"	"		
R26		"	1.5k Ω	"	"	"		
R27		"	220 Ω	"	"	"		
R28		"	2.2k Ω	"	"	"		
R29		"	330 Ω	"	"	"		
R30		"	3.3k Ω	"	"	"		
R31		"	1.2k Ω	"	"	"		
R32		"	180 Ω	"	"	"		
R33		"	680 Ω	"	"	"		
R34		"	47 Ω	"	"	"		
R35		"	1k Ω	"	"	"		
R36		"	68 Ω	"	"	"		
R37		"	1.5k Ω	"	"	"		
R38		"	2.2k Ω	"	"	"		
R39		"	470 Ω	"	"	"		
R40		"	2.7 k Ω	"	"	"		
R41		"	1k Ω	"	"	"		
R42		"	150 Ω	"	"	"		
R43		"	1.5k Ω	"	"	"		
R44		"	150 Ω	"	"	"		
R45		"	2.2k Ω	"	"	"		
R46		"	120 Ω	"	"	"		
R47		"	2.7k Ω	"	"	"		
E48		"	470 Ω	"	"	"		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN %				STYKLISTE		
30.4.71		Switch Unit 179-A1 (part of 179-120)				2 Blade - Blad 1		
BM/DG		Electrical Partslist				179-A131-A 4		

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R49		Resistor 4.7k Ω 1/8W 5%	Resista SK 2		
R50		" 470 Ω " "	"		
R51		" 56 Ω " "	"		
R52		" 560 Ω " "	"		
R53		" 68 Ω " "	"		
R54		" 680 Ω " "	"		
R55		" 82 Ω " "	"		
R56		" 820 Ω " "	"		
R57		" 56 Ω " "	"		
R58		" 1k Ω " "	"		
R59		" 82 Ω " "	"		
R60		" 220 Ω " "	"		
R61		" 33 Ω " "	"		
R62		" 270 Ω " "	"		
R63		" 270 Ω " "	"		
R64		" 39 Ω " "	"		
R65		" 330 Ω " "	"		
R66		" 390 Ω " "	"		
R67		" 68 Ω " "	"		
R68		" 56 Ω " "	"		
R69		" 47 Ω " "	"		
R70		" 56 Ω " "	"		
R71		" 56 Ω " "	"		
R72		" 56 Ω " "	"		
	182-9040	Printed Circuit Board 182-900 (3 of the circuit boards are divided into halves) Switch type M x 4/8 x 6 K T = 12	NTP EBE	4	
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN 46		STYKLISTE	
30.4.71		Switch Unit 179-A1 (part of 179-120)	2. Blade - Blad.....2.....	
BM/DG		Electrical Partslist		179-A131-A4	

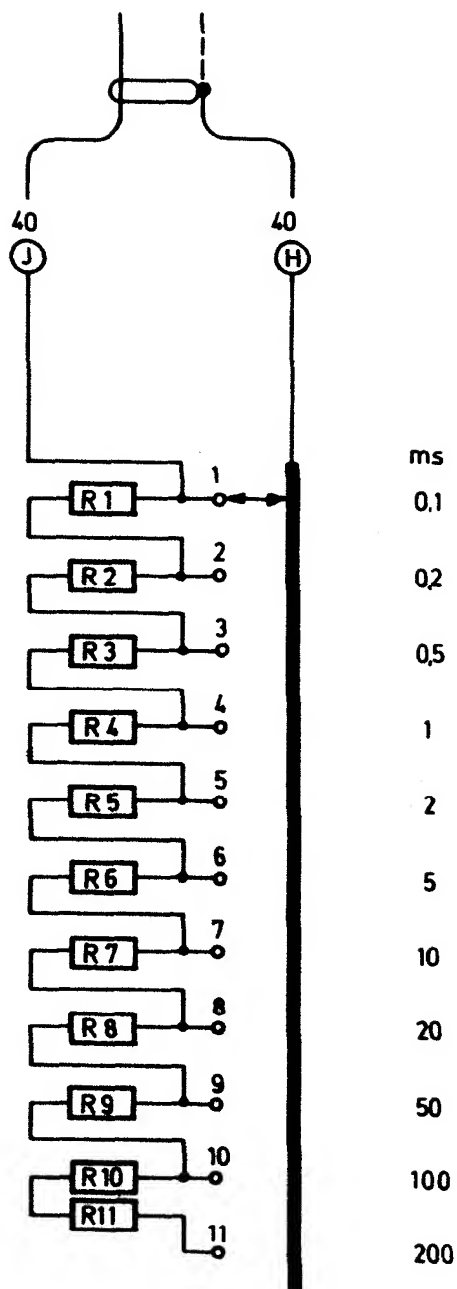



Målestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71. IW
Tolerance	± mm ± °		Switch Unit 179-A2 (part of 179-120)	Godk.
Materiale		Function : Ratio Diagram		TEGNING NR.
Behandl.			179-A230-A-4	
Del af				
Antal				

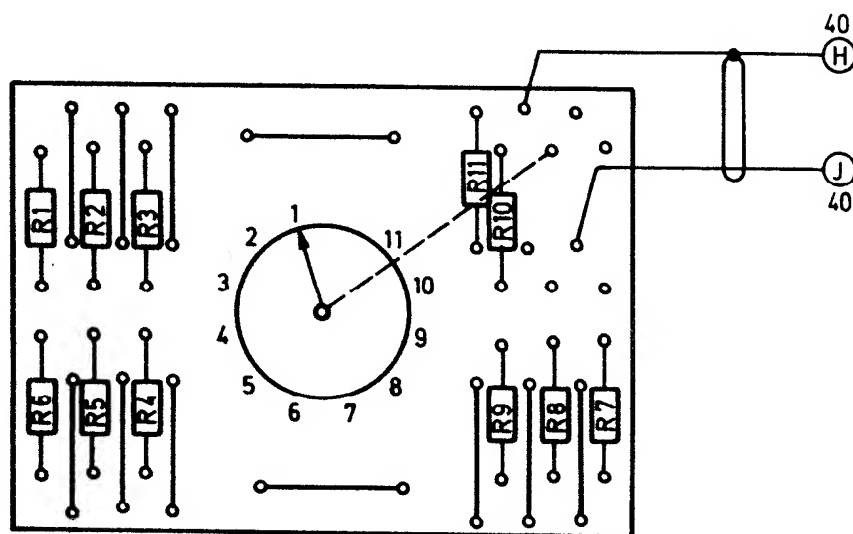



Målestok	2:1	INGENIØRFIRMA N. TØNNEP PEDERSEN A/s		Tegn.	11-5-71 IW
Tolerance	± mm ± °	Switch Unit 179-A2 (part of 179-120)		Godk.	
Materiale		Function : Ratio Component Lay - out		TEGNING NR.	
Behandl.				179- A 241- A-4	
Del af					
Antal					

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R1 R2 R3 R4 R5 R6 R7		Resistor 1.8k Ω 1/8W 5% " 150 Ω " " " 470 Ω " " " 82 Ω " " " 330 Ω " " " 33 Ω " " " 82 Ω " "	Resista SK2 " " " " " "		
	182-9040	Printed Circuit Board 182-900 Switch type Mx 2/4 x 5 K T = 12	NTP EBE	1 2	
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN AS	STYKLISTE		
30.4.71		Switch Unit 179-A2 (part of 179-120)	1 Blade - Blad 1		
BM/DG		Electrical Partslist	179-A231-A-4		

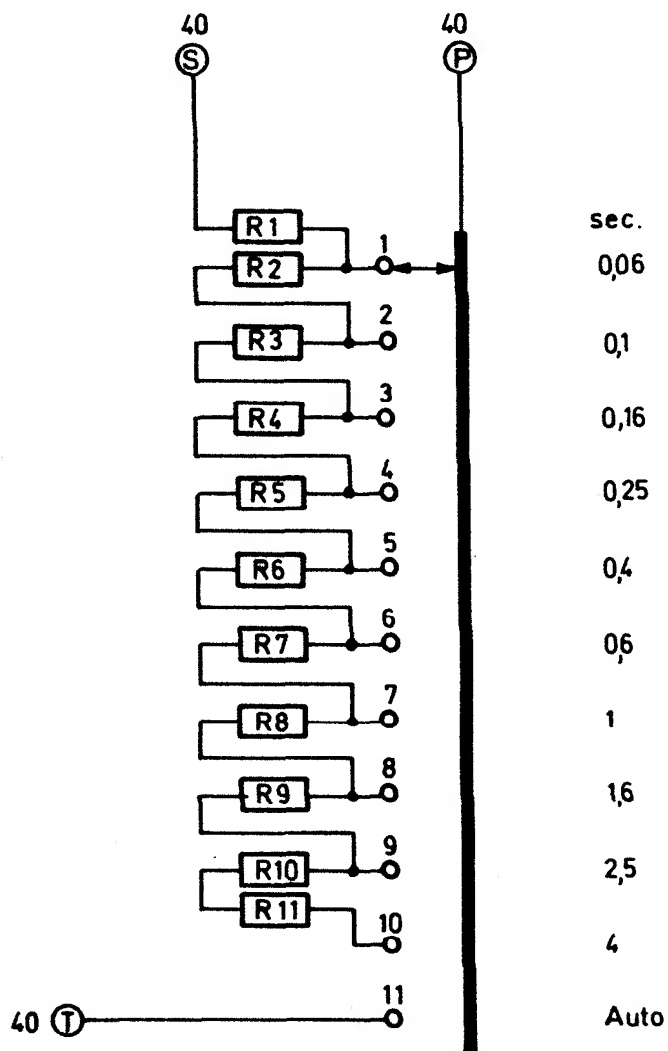


Pos.	Antal:	Materiale:	Behandl.	Del af
Målestok:	Switch Unit 179 - A3 (Part of 179-140) Fuction: Attack Diagram			 NTP ELEKTRONIK A/S
Tolerance: \pm mm				
Tegnet : 2-2-77 TL				
Godkendt:				
Revideret:				179 - A330 - A-4

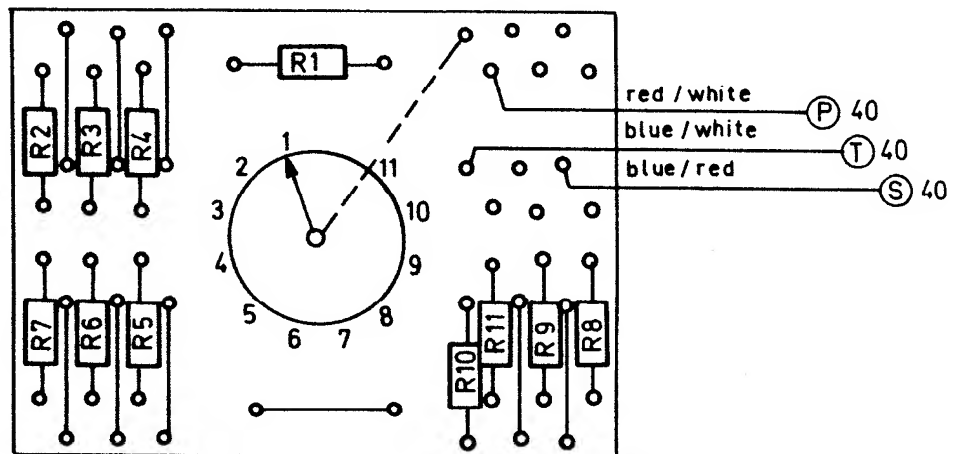


Pos	Antal	Materiale	Behandl	Del af
Målestok		Switch Unit 179-A3 (Part of 179-140) Function: Attack Components Lay-out		<div> NTP ELEKTRONIK A/S</div>
Tolerance: ± mm				
Tegnet : 2-2-77 TL				
Godkendt:				
Revideret :				
				179-A341-A-4

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R1		Resistor 220 Ω 1/8W 5%	Resista SK 2		
R2		" 680 Ω " "	"		
R3		" 1.2k Ω " "	"		
R4		" 2.2k Ω " "	"		
R5		" 6.8k Ω " "	"		
R6		" 12k Ω " "	"		
R7		" 27k Ω " "	"		
R8		" 82k Ω " "	"		
R9		" 180k Ω " "	"		
R10		" 330k Ω " "	"		
R11		" 270k " "	"		
	182-9040	Printed Circuit Board 182-900	NTP		
		Switch type Mx 1/1 x 11 K T = 12	EBE		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN Å		STYKLISTE	
30.4.71		Switch Unit 179-A3 (part of 179-120)	1 Blade - Blad.....	
BM/DG		Electrical Partslist		179-A331-A-4	



Målestok		INGENIØRFIRMA N. TØNNES PEDERSEN A/s	Tegn.	12-5-71 IW
Tolerance	± mm ± °	Switch Unit 179 - A4 (part of 179 120)	Godk.	
Materiale		Function : Recovery Diagram	TEGNING NR.	
Behandl.			179-A430-A-4	
Del af				
Antal				



Målestok	2:1	INGENIØRFIRMA N. TØNNES PEDERSEN A/s		Tegn.	11-5-71-IW
Tolerance	\pm mm \pm 0	Switch Unit 179-A4 (part of 179-120)		Godk.	
Materiale					
Behandl.		Function : Recovery Component Lay-out		TEGNING NR.	
Del af				179-A441-A4	
Antal					

POS.	TEGN. NR.	BETEGNELSE	MATERIALE	ANT.	
R1		Resistor 47k Ω 1/8W 5%	Resista SK 2		
R2		" 33k Ω " "	"		
R3		" 39k Ω " "	"		
R4		" 68k Ω " "	"		
R5		" 120k Ω " "	"		
R6		" 180k Ω " "	"		
R7		" 390k Ω " "	"		
R8		" 560k Ω " "	"		
R9		" 680k Ω " "	"		
R10		" 470k Ω " "	"		
R11		" 1M Ω " "	"		
	182-9040	Printed Circuit Board 182-900	NTP		
		Switch type Mx 1/1 x 11 K T=12	EBE		
SIG./DATO		INGENIØRFIRMA N. TØNNES PEDERSEN 46		STYKLISTE	
30.4.71		Switch Unit 179-A4 (part of 179-120)	1.....Blade - Blad.....1.....	
BM/DG		Electrical Partslist		179-A431-A-4	